Forage To Make Taste Buds Tingle

Just as chefs in a fine restaurant are intent on creating meals to delight your taste buds, ARS scientists are busy sleuthing the secrets of how to tempt palates of ruminants like cattle, sheep, and goats.

Knowing more about the cues that govern cattle's culinary choices can mean healthier animals that make better weight gains and bigger profits for ranchers. The research can also help plant breeders avoid the pitfall of developing a new forage that grows fast and has high yields—but doesn't appeal to animal diners.

ARS soil scientist Henry F. Mayland at Kimberly, Idaho, is coordinating a series of ARS and university studies designed to reveal "just what is it about certain forages that makes animals keep coming back for more."

In perhaps the best known of these tests, Mayland—along with ARS colleagues Dwight S. Fisher at Watkinsville, Georgia, and Joseph C. Burns at Raleigh, North Carolina—showed that cattle, sheep, and goats prefer hay harvested in the afternoon to that cut in the morning.

"The animals," says Mayland, "apparently discriminate on the basis of total nonstructural carbohydrates—the easily digestible starches and sugars in the forage."

"Our feeding study," Mayland points out, "was likely the first to show up to a 50-percent difference in forage preferences based on time of day the forage was cut."

Follow-up experiments with alfalfa hay showed the same trend. "The bottom line," notes Dwight Fisher, "is that farmers may get better performance from their livestock if they feed them hay harvested in the afternoon. It's an easy, practical way to enhance profits at no extra cost."

Other research scrutinized different chemical and physical characteristics of forages. For one investigation, scientists analyzed some 50 different chemicals given off from freshly harvested samples of 8 different kinds of tall fescue grass and nearly 100 chemicals from tall fescue hay.

Robert A. Flath, formerly with ARS at Albany, California, did the work in collaboration with Mayland and Glenn E. Shewmaker, who is now at the University of Idaho. Cattle preferred fescues with high levels of a volatile—that is, easily vaporized—natural chemical known as 6-methyl-5-hepten-2-one. But they didn't like fescues with high amounts of two other volatiles, (Z)-3-hexenyl propionate and acetic acid. However, a study of two other classes of chemicals in these fescues—amino acids and nonvolatile organic acids—showed no link to forage choices.

Other experiments are probing the effects of other chemicals, including the minerals calcium, magnesium, and potassium, along with physical characteristics such as plant height or the amount of energy an animal has to invest to tear off a mouthful of grass.—By **Marcia Wood,** ARS, and **Jill Lee,** formerly with ARS.

This research is part of Soil Resource Management, an ARS National Program described on the World Wide Web at http://www.nps.ars.usda.gov/programs/nrsas.htm.

Henry F. Mayland is in the USDA-ARS Northwest Irrigation and Soils Research Laboratory, 3793 N. 3600 E., Kimberly, ID 83341; phone (208) 423-6517, fax (208) 423-6555, e-mail mayland@kimberly.ars.pn.usbr.gov.

Dwight S. Fisher is with the USDA-ARS Southern Piedmont Conservation Research Laboratory, 1420 Experiment Station Rd., Watkinsville, GA 30677; phone (706) 769-5631, ext. 268, fax (706) 769-8962, e-mail dwight_fisher@scientist.com.

Joseph C. Burns is in the USDA-ARS Plant Science Research Unit, Room 1119, Williams Hall, Box 7620, North Carolina State University, Raleigh, NC 27695; phone (919) 515-7599, fax (919) 515-7959, e-mail jburns@ncsu.edu. ◆